Data Sheet

Cisco Catalyst 4948-10GE Switch

10 Gigabit Ethernet Switching for High-Performance, Rack-Optimized Server Switching

The Cisco® Catalyst® 4948-10GE Switch is a wire-speed, low-latency, Layer 2–4, 1-rack-unit (1-RU), fixed-configuration switch for rack-optimized server switching. Based on the proven Cisco Catalyst 4500 Series hardware and software architecture, the Cisco Catalyst 4948-10GE offers exceptional performance, bandwidth, and reliability for low-density, multilayer aggregation of high-performance servers and workstations.

The Cisco Catalyst 4948-10GE offers 48 ports of wire-speed 10/100/1000BASE-T with 2 ports of wire-speed 10 Gigabit Ethernet (X2 optics). Exceptional reliability and serviceability are delivered with optional internal AC or DC 1+1 hot-swappable power supplies and a hot-swappable fan tray with redundant fans (Figures 1 and 2).

Figure 1. Cisco Catalyst 4948-1 0GE Switch

Figure 2. Rear View of Cisco Catalyst 4948-10GE Switch with Dual Redundant Power Supplies and Removable Fan Tray

KEY FEATURES AND BENEFITS

Wire-Speed Performance in All Directions

The Cisco Catalyst 4948-10GE delivers wire-speed throughput with low latency for data-intensive applications using a 136-Gbps switching fabric with a 102 million packets per second (mpps) forwarding rate in hardware for Layer 2–4 traffic. High-performance switching is maintained regardless of the number of route entries or Layer 3 and 4 services enabled. Hardware-based Cisco Express Forwarding routing architecture allows for increased scalability and performance. X2 10 Gigabit Ethernet optics provide 20 Gigabit Ethernet wire-speed uplinks for maximum throughput of traffic.

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Power-Supply Redundancy for Nonstop Operation

The Cisco Catalyst 4948-10GE provides reliability for critical applications with 1+1 redundant, hot-swappable internal AC or DC power supplies. The 1+1 power-supply design provides A-to-B failover when power supplies are connected to different circuits. AC and DC power supplies can be mixed in the same unit for maximum deployment flexibility. The Cisco Catalyst 4948-10GE also has a hot-swappable fan tray with four redundant fans for additional serviceability and availability.

Robust Network Security

Multiple server communities can be securely established on a single Cisco Catalyst 4948-10GE. The switch can isolate different Layer 2 community traffic simultaneously, while conserving IP address space. In an unlikely event that a server is compromised, the Cisco Catalyst 4948-10GE can prevent man-in-the-middle and IP-spoofing attacks to the rest of community with no change to the server configuration. Such attacks can be logged by the Cisco Catalyst 4948-10GE for auditing.

The Cisco Catalyst 4948-10GE offers a rich set of industry-leading, integrated security features to proactively lock down your critical network infrastructure. It reduces network security risks with a rich set of Network Admission Control (NAC) capabilities and 802.1x-based user authentication, authorization, and accounting (AAA). The security policy enforcement is uncompromised with the wire-rate, dedicated access control lists (ACLs) to fend off ever-increasing virus and security attacks. The Cisco Catalyst 4948-10GE offers powerful, easy-to-use tools to effectively prevent the untraceable man-in-the-middle attacks, control-plane resource exhaustion, IP spoofing, and flooding attacks, without any change to the end-user or host configurations. Secure remote access, file transfers and network management are accomplished with the Secure Shell (SSH Version 1 and Version 2) protocols, SCP and SNMPv3 respectively.

Network Admission Control (NAC) is a foundational component of the Cisco Self-Defending Network strategy, improving the network's ability to automatically identify, prevent, and respond to security threats. NAC enables the Cisco Catalyst switches to collaborate with third-party solutions for security-policy compliance and enforcement before a host is permitted to access the network.

NAC performs posture validation at the Layer 2 network edge for hosts with or without 802.1x enabled. Vulnerable and noncompliant hosts can be isolated, given reduced network access or directed to remediation servers based on organizational policy. By ensuring that every host complies with security policy, organizations can significantly reduce the damage caused by infected hosts. NAC is available through standard software upgrades or Cisco SMARTnet contracts on Cisco Catalyst switches.

Comprehensive Management

The Cisco Catalyst 4948-10GE includes a single, dedicated 10/100 console port and a single, dedicated 10/100 management port for offline disaster recovery. Remote in-band management is available with SNMP, Telnet client, BOOTP, and Trivial File Transfer Protocol (TFTP). Support for local or remote out-of-band management is delivered through a terminal or modem attached to the console interface. The management port helps enable the Cisco Catalyst 4948-10GE to reload a new image from a TFTP server within seconds.

The Cisco Catalyst 4948-10GE delivers a comprehensive set of management tools to provide the visibility and control required for server switching. Managed with CiscoWorks solutions and embedded CiscoWorks CiscoView, the Cisco Catalyst 4948-10GE can be configured and managed to deliver device, VLAN, traffic, and policy management. These Web-based management tools offer numerous services, including software deployment and quick isolation of error conditions.

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SOFTWARE CONFIGURATION OPTIONS

Table 1 describes the software configuration options for the Cisco Catalyst 4948-10GE.

Table 1. Software Configuration Options for the Cisco Catalyst 4948-10GE

Software Image	Description
IP Base Image	Standard Layer 3 image, including Routing Information Protocol Version 1 (RIPv1), RIPv2, static routes, includes EIGRP stub.
Enterprise Services Image	Enhanced Layer 3 image, including Open Shortest Path First (OSPF), Intermediate System-to-Intermediate System (IS-IS), Enhanced Interior Gateway Routing Protocol (EIGRP), and Border Gateway Protocol (BGP) AppleTalk, and Internetwork Packet Exchange (IPX) software routing. Also includes all IP Base Image features.

Table 2 compares the Cisco Catalyst 4948 Switch to the Catalyst 4948-10GE Switch.

Table 2. Comparison Between Cisco Catalyst 4948 and Catalyst 4948-10GE

Feature and Description	Cisco Catalyst 4948	Cisco Catalyst 4948-10GE
Layer 2-4 Performance	72 mpps and 96 Gbps	102 mpps and 136 Gbps
Uplink Optic Types	4 SFP optics	Two X2 (10 GE) optics
Switching Capacity	96 Gbps	136 Gbps
Throughput	72 mpps	102 mpps
Multilayer Switching	Full Layer 2-4 services and routing	Full Layer 2-4 services and routing
Minimum Software Requirement	Cisco IOS® Software Release 12.2(20)EWA or later	Cisco IOS Software Release 12.2(25)EWA or later
CPU	266 MHz	666 MHz
Synchronous Dynamic RAM (SDRAM)	256 MB	256 MB
Active VLANs	2048	2048
Multicast Entries	28,000 (Layer 3)	
16,000 (Layer 2)	28,000 (Layer 3)	
16,000 (Layer 2)		
Per VLAN Spanning Tree (PVST) and VLAN IDs	4096	4096
Spanning Tree Protocol Instances	1500	1500
Switched Virtual Interfaces (SVIs)	2k	2k

PREDICTABLE PERFORMANCE AND SCALABILITY

The Cisco Catalyst 4948-10GE is optimized for multimedia applications with its advanced multicast support. It supports Protocol Independent Multicast (PIM), Source Specific Multicast (S SM), and Pragmatic General Multicast (PGM), providing end users with additional scalability to support multimedia applications. Also supported is Internet Engineering Task Force (IGMP) snooping in hardware, enhancing performance and reducing network traffic by allowing a switch to dynamically add and remove hosts from a multicast group.

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INTELLIGENT NETWORK SERVICES WITH QOS AND SOPHISTICATED TRAFFIC MANAGEMENT

The Cisco Catalyst 4948-10GE offers superior per-port quality of service (QoS) features to help ensure that network traffic is classified, prioritized, and scheduled optimally to efficiently manage bandwidth-hungry multimedia, and time-sensitive and mission-critical applications. The Catalyst 4948-10GE can classify, police, and mark incoming packets, allowing the administrator to differentiate between traffic flows and enforce policies. Sharing, shaping, and strict-priority configurations determine scheduling of egress traffic. The Catalyst 4948-10GE also supports Dynamic Buffer Limiting (DBL), a congestion-avoidance feature. For details about the QoS features (including DBL) on the Catalyst 4948-10GE, refer to the QoS on Cisco Catalyst 4500 Series supervisor engines overview at: http://www.cisco.com/en/US/products/hw/switches/ps4324/prod_white_papers_list.html

FEATURES AT A GLANCE

Layer 2 Features

- Layer 2 hardware forwarding at 102 mpps
- Layer 2 switch ports and VLAN trunks
- IEEE 802. 1Q VLAN encapsulation
- Inter-Switch Link (ISL) VLAN encapsulation
- Dynamic Trunking Protocol (DTP)
- VLAN Trunking Protocol (VTP) and VTP domains
- Support for 2048 VLANs per switch
- Per-VLAN Spanning Tree (PVST) and PVST Plus (PVST+)
- Spanning-tree PortFast and PortFast guard
- Spanning-tree UplinkFast and BackboneFast
- 802.1s
- 802.1w
- 802.3ad
- Spanning-tree root guard
- Cisco Discovery Protocol versions 1 and 2
- IGMP snooping versions 1, 2, and 3
- Cisco EtherChannel® technology, Cisco Fast EtherChannel technology, and Cisco Gigabit EtherChannel technology
- Port Aggregation Protocol (PAgP)
- Link Aggregation Control Protocol (LACP)
- Unidirectional link detection (UDLD) and aggressive UDLD
- 802. 1q-in-802. 1q (QinQ) in hardware
- Layer 2 protocol tunneling
- Multilayer Jumbo Frames (up to 9216 bytes)
- Baby Giants (up to 1600 bytes)
- Unidirectional Ethernet
- Storm control (formally known as broadcast and multicast suppression)
- Forced 10/100 autonegotiation
- Web Content Communication Protocol Version 2 Layer 2 Redirect
- Private VLAN Promiscuous Trunk

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Layer 3 Features

- Hardware-based IP Cisco Express Forwarding routing at 102 mpps
- IP routing protocols: EIGRP, OSPF, RIP, and RIP2
- BGP4 and Multicast Border Gateway Protocol (MBGP)
- Nonstop Forwarding awareness
- Hot Standby Router Protocol (HSRP)
- Software routing of Internetwork Packet Exchange (IPX) and AppleTalk
- IS-IS routing protocol
- IGMP v1, v2, and v3
- IGMP filtering on access and trunk ports
- IP Multicast routing protocols: PIM, SSM, and Distance Vector Multicast Routing Protocol (DVMRP)
- Pragmatic General Multicast (PGM)
- Cisco Group Multicast Protocol server
- Full Internet Control Message Protocol (ICMP) support
- ICMP Router Discovery Protocol
- Policy-based routing (PBR)
- Virtual Route Forwarding lite (VRF-lite)
- IPv6 (software switched)
- OSPF fast convergence
- EIGRP stub
- Virtual Router Redundancy Protocol (VRRP)

Sophisticated QoS and Traffic Management

- Per-port QoS configuration
- Support for four queues per port
- Strict priority queuing
- IP differentiated services code point (DSCP)
- Classification and marking based on IP type of service (ToS) or DSCP
- Classification and marking based on full Layer 3 and Layer 4 headers
- Input and output policing based on Layer 3 and Layer 4 headers
- Support for 512 policers on ingress and 512 policers on egress
- Shaping and sharing output queue management
- DBL—congestion-avoidance feature
- No performance penalty for granular QoS functions
- Per-port, per-VLAN QoS

Predictable Performance

- 136-Gbps switching fabric
- Layer 2 hardware forwarding at 102 mpps
- Layer 3 hardware-based IP Cisco Express Forwarding routing at 102 mpps
- Layer 4 TCP/User Datagram Protocol (UDP) hardware-based filtering at 102 mpps
- No performance penalty with advanced Layer 3 and Layer 4 services enabled
- Software-based learning at a sustained rate of 3000 hosts per second
- Support for 55,000 unicast and 16000 multicast MAC addresses

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- Support for 32,000 entries in routing table (shared between unicast and multicast)
- Scalability to 2000 virtual ports (VLAN port instances)
- Bandwidth aggregation up to 40 Gbps using Cisco Gigabit Ethernet EtherChannel technology
- Hardware-based multicast management
- Hardware-based ACLs, router ACLs (RACLs), VLAN ACLs
- Comprehensive Management
- Manageable through Cisco Network Assistant
- Single console port and single IP address to manage all system features
- Software configuration management, including local and remote storage
- Manageable through CiscoWorks Windows network-management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs
- SNMPv1, v2, and v3 instrumentation, delivering comprehensive in-band management
- CLI-based management console to provide detailed out-of-band management
- Remote Monitoring (RMON) software agent to support four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis
- Support for all nine RMON groups through the use of a Cisco SwitchProbe® analyzer (Switched Port Analyzer [SPAN]) port, which permits traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe
- Analysis support, including ingress port, egress port, and VLAN SPAN
- Layer 2 traceroute
- Remote SPAN (RSPAN)
- Cisco SmartPort macros
- SPAN ACL filtering
- Dynamic Host Configuration Protocol (DHCP) client autoconfiguration
- Enhanced SNMP MIB support
- HTTPS
- Time Domain Reflectometry (TDR)
- MAC Address Notification

Advanced Security

- TACACS+ and RADIUS, which help enable centralized control of the switch and restrict unauthorized users from altering the configuration
- Standard and extended ACLs on all ports
- 802. 1x user authentication (with VLAN assignment, voice VLAN, port security, guest VLAN, private guest VLAN, private VLAN, RADIUS-Supplied Session Timeout extensions)
- 802.1x accounting
- 802. 1x authentication failure
- 802. 1x Private VLAN assignment
- 802. 1x Private Guest VLAN
- 802. 1x Radius-supplied time out
- Trusted boundary
- Router ACLs (RACLs) on all ports (no performance penalty)
- VLAN ACLs (VACLs)
- Port ACLs (PACLs)
- Private VLANs (PVLANs) on access and trunk ports
- DHCP snooping

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- DHCP Option 82
- DHCP Option 82 insertion
- DHCP Option 82 Pass Through
- Port security
- Sticky port security
- SSHv1 and SSHv2
- VLAN Management Policy Server (VMPS) client
- Unicast MAC filtering
- Unicast port flood blocking
- Dynamic Address Resolution Protocol (ARP) inspection
- IP source guard
- Community Private VLANs
- Trunk Port Security
- 802.1x Inaccessible Authentication Bypass
- MAC Authentication Bypass
- Control Plane Policing
- 802.1x Unidirectional Controlled Port
- Voice VLAN Sticky Port Security
- Secure Copy Protocol (SCP)

TECHNICAL SPECIFICATIONS

Management

- Cisco Works LAN Management Solution (LMS), including Cisco Works Resource Manager Essentials
- Cisco View
- Cisco Network Assistant BGP4-MIB.my
- BRIDGE-MIB.my* (RFC 1493)
- CISCO-BULK-FILE-MIB.my
- CISCO-CDP-MIB.my
- CISCO-CLASS-BASED-QOS-MIB.my
- CISCO-CONFIG-COPY-MIB.my
- CISCO-CONFIG-MAN-MIB.my
- CISCO-ENTITY-ASSET-MIB.my
- CISCO-ENTITY-EXT-MIB.my
- CISCO-ENTITY-FRU-CONTROL-MIB.my
- CISCO-ENTITY-SENSOR-MIB.my
- CISCO-ENTITY-VENDORTYPE-OID-MIB.my
- CISCO-ENVMON-MIB.my
- CISCO-FLASH-MIB.my
- CISCO-FTP-CLIENT-MIB.my
- CISCO-HSRP-MIB.my
- CISCO-IETF-IP-MIB.my
- CISCO-IETF-IP-FORWARD-MIB.my
- CISCO-IETF-ISIS-MIB.my

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- CISCO-IF-EXTENSION-MIB.my
- CISCO-IGMP-FILTER-MIB.my
- CISCO-IMAGE-MIB.my
- CISCO-IPMROUTE-MIB.my
- CISCO-L2-TUNNEL-CONFIG-MIB.my
- CISCO-L2L3-INTERFACE-CONFIG-MIB.my
- CISCO-LAG-MIB.my
- CISCO-MEMORY-POOL-MIB.my
- CISCO-NDE-MIB.my
- CISCO-PAGP-MIB.my
- CISCO-PAE-MIB.my
- CISCO-PING-MIB.my
- CISCO-PORT-SECURITY-MIB.my
- CISCO-PORT-STORM-CONTROL-MIB.my
- CISCO-PRIVATE-VLAN-MIB.my
- CISCO-PROCESS-MIB.my
- CISCO-PRODUCTS-MIB.my
- CISCO-RF-MIB.my
- CISCO-RMON-CONFIG-MIB.my
- CISCO-RTTMON-MIB.my
- CISCO-STP-EXTENSIONS-MIB.my
- CISCO-SYSLOG-MIB.my
- CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB.my
- CISCO-VLAN-MEMBERSHIP-MIB.my
- CISCO-VTP-MIB.my
- DOT3-MAU-MIB.my (RFC 3636)
- ENTITY-MIB.my
- ETHERLIKE-MIB.my
- EXPRESSION-MIB.my
- HC-RMON-MIB.my
- IEEE8021-PAE-MIB.my
- IEEE8023-LAG-MIB.my (802.3ad)
- IF-MIB.my
- IGMP-MIB.my
- IPMROUTE-MIB.my
- NOVELL-IPX-MIB.my
- NOVELL-RIPSAP-MIB.my
- OLD-CISCO-TS-MIB.my
- PIM-MIB.my
- RFC1213-MIB.my (MIB-II)
- RFC1243-MIB.my (APPLETALK MIB)
- RFC1253-MIB.my (OSPF-MIB)
- RMON-MIB.my (RFC 1757)

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- RMON2-MIB.my (RFC 2021)
- SMON-MIB.my (Internet-Draft)
- SNMP-FRAMEWORK-MIB.my (RFC 2571)
- SNMP-MPD-MIB.my(RFC 2572)
- SNMP-NOTIFICATION-MIB.my (RFC 2573)
- SNMP-TARGET-MIB.my (RFC 2573)
- SNMP-USM-MIB.my(RFC 2574)
- SNMP-VACM-MIB.my (RFC 2575)
- SNMPv2-MIB.my
- TCP-MIB.my
- UDP-MIB.my
- RIP SNMP MIB

Industry Standards

- **Ethernet**—IEEE 802.3 and 10BASE-T
- **Fast Ethernet**—IEEE 802.3u, 100BASE-TX, and 100BASE-FX
- **Gigabit Ethernet**—IEEE 802.3z and 802.3ab
- IEEE 802. 1D Spanning Tree Protocol
- IEEE 802.1w rapid reconfiguration of spanning tree
- IEEE 802. 1s multiple VLAN instances of spanning tree
- IEEE 802.3 ad LACP
- IEEE 802. 1p class-of-service (CoS) prioritization
- IEEE 802.1Q VLAN
- IEEE 802. 1x user authentication
- X2 support
- RMON I and II standards

Indicator and Port Specifications

- **System status**—Green (operational); red (faulty)
- **Console**—RJ-45 female
- Reset (switch recessed protected)
- **Uplinks**—Link and active
- **Image management port**—10/100BASE-TX (RJ-45 female) data terminal equipment (DTE); green (good); orange (disabled); off (not connected)

Supported X2 Optics

Table 3 lists the X2 optics supported by the Cisco Catalyst 4948-10GE.

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Table 3. X2 Optics Supported by Cisco Catalyst 4948-10GE

Type	Maximum Distance over Specified Medium
LR	10 km on single-mode fiber (SMF) (G.652)
CX4	Up to 15m on IBX4 cable
LX4	300m on multimode fiber (MMF)
SR	26 to 300m on MMF (depends on MMF type)
ER	40 km on SMF

Power-Supply Specifications

The Cisco Catalyst 4948-10GE offers a choice of 300-watt (W) AC or DC power supplies. The switch can operate with one power supply present. When two power supplies are installed, the switch shares the power load between the two supplies (Table 4).

Table 4. AC and DC Power-Supply Specifications

	300W AC	300W DC
Input Current	4A at 100V	
2A at 240V	8A at -48 to -60V	
Output Current	25A at 12 VDC	25A @ 12 VDC
Weight	Weight 2.0 kg	Weight 2.0 kg
Heat Dissipation	1023 BTU/hr	1023 BTU/hr

Switch Dimensions

- **Width:** 17.290 inches (43.9166 centimeters [cm])
- **Depth:** 16.14 inches (40.9956 cm)
- **Height:** 1.712 inches (4.445 cm)
- **Weight:** 16.5 pounds (7.48 kilograms [kg]) with one power supply

Software Requirements

The Cisco Catalyst 4948-10GE is supported only in Cisco IOS Software and is not supported in the Cisco Catalyst Operating System Software (CatOS). The minimum software version is Cisco IOS Software Release 12.2(25)EWA or later.

Environmental Conditions

- **Operating temperature:** 32º to 104ºF (0º to 40ºC)
- **Storage temperature:** –40º to 167ºF (–40º to 75ºC)
- **Relative humidity:** 10 to 90 percent, noncondensing
- **Operating altitude:** –60 to 2000m

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Regulatory Standards Compliance

Table 5 lists the Cisco Catalyst 4948-10GE regulatory standards compliance.

Table 5. Regulatory Standards Compliance for Cisco Catalyst 4948-10GE

Specification	Description
Regulatory Compliance	Products bear CE Marking, indicating compliance with the 89/336/EEC and 73/23/EEC directives, which include the following safety and EMC standards.
Safety	• UL 60950-1 • CAN/CSA-C22.2 No. 60950-1 • EN 60950-1 • IEC 60950-1 • AS/NZS 60950 • IEC 60825-1 • IEC 60825-2 • EN 60825-1 • EN 60825-2 • 21 CFR 1040
EMC	• FCC Part 15 (CFR 47) Class A • ICES-003 Class A • EN55022 Class A • CISPR22 Class A • AS/NZS 3548 Class A • VCCI Class A • EN55024 • ETS300 386 • EN50082-1 • EN61000-3-2 • EN61000-3-3

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Table 6 lists the industry EMC, safety, and environmental standards for the Cisco Catalyst 4948-10GE.

Table 6. Industry EMC, Safety, and Environmental Standards

Specification	Description
Network Equipment Building Standards (NEBS)	• GR-63-Core NEBS Level 3 (pending) • GR-1089-Core NEBS Level 3 (pending)
ETSI	• ETS 300 019 Storage Class 1.1(pending) • ETS 300 019 Transportation Class 2.3 (pending) • ETS 300 019 Stationary Use Class 3.1(pending)

Table 7 lists ordering information for the Cisco Catalyst 4948-10GE.

Table 7. Ordering Information

Product Number	Description
WS-C4948-10GE-S	Cisco Catalyst 4948-10GE, IP Base Image (RIP, static routes,), one AC power supply, fan tray
WS-C4948-10GE-E	Cisco Catalyst 4948-10GE, Enterprise Services Image (OSPF, EIGRP, IS-IS, BGP, IPX, AppleTalk), one AC power supply, fan tray
WS-C4948-10GE	Cisco Catalyst 4948-10GE, optional software image, optional power supplies, fan tray
S49IPB-12231SG	Cisco IOS Software for the Cisco Catalyst 4900 Series (IP Base image with EIGRP-stub support)
S49IPBK9-12231SG	Cisco IOS Software for the Cisco Catalyst 4900 Series (IP Base image with Triple Data Encryption Standard [3DES] and EIGRP-stub support)
S49ES-12231SG	Cisco IOS Software for the Cisco Catalyst 4900 Series (Enterprise Services image)
S49ESK9-12231SG	Cisco IOS Software for the Cisco Catalyst 4900 Series (Enterprise Services image with 3DES)
PWR-C49-300AC(=)	Cisco Catalyst 4900 300W AC power supply
PWR-C49-300AC/2	Cisco Catalyst 4900 300W AC power supply, redundant
PWR-C49-300DC(=)	Cisco Catalyst 4900 300W DC power supply
PWR-C49-300DC/2	Cisco Catalyst 4900 300W DC power supply, redundant
WS-X4991=	Cisco Catalyst 4900 fan tray (spare)
C4948-ACC-KIT=	Spare rack-mount and cable guide
C4948-BKT-KIT=	C4900 front- and rear-mount brackets
Power Cable Options	
CAB-7KAC	AC power cord, North America
CAB-7KACA	AC power cord (Australia)
CAB-7KACE	AC power cord (Europe)
CAB-7KACI	AC power cord CD12 (Italy)
CAB-7KACR	AC power cord (Argentina)
CAB-7KACSA	AC power cord (South Africa)
CAB-7KACU	AC power cord (United Kingdom)
CAB-7KACSXX	AC power cord (Switzerland)

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Product Number	Description
X2 Options	
X2-10GB-LR	10GB long-reach (LR) module
X2-10GB-CX4	10GB CX4 module
X2-10GB-LX4	10GB LX4 module
X2-10GB-SR	10GB short-reach (SR) module
X2-10GB-ER	10GB extended-reach (ER) module**

** Available in Q4 2005..

WARRANTY

The warranty for the Cisco Catalyst 4948-10GE is a 1-year limited hardware warranty; it includes hardware replacement with a 10-day turnaround from receipt of a return materials authorization (RMA).

CISCO TECHNICAL SUPPORT SERVICES

Cisco Technical Support Services help to ensure that your products from Cisco Systems® operate efficiently, remain highly available, and benefit from current system software to assist you in effectively managing your network service while controlling operational costs.

Cisco Technical Support Services (Tables 8 and 9) provide significant benefits that go beyond what is offered under the Cisco warranty policy. Services available under a Cisco SMARTnet® service contract that are not covered under a warranty include the following:

- Latest software updates
- Rapid replacement of hardware in next-day, 4-hour, or 2-hour dispatch options
- Ongoing technical support through Cisco Technical Assistance Center (TAC)
- Registered access to Cisco.com

Table 8. Cisco Technical Support Services-Components

Service Feature	Benefits
Software Support	Software support offers maintenance and minor and major updates for licensed feature sets. Downloading new maintenance releases, patches, or updates of Cisco IOS Software helps to enhance and extend the useful life of Cisco devices. Through major software updates, it is possible to extend the life of equipment and maximize application technology investments by: • Adding new functions that, in many cases, require no additional hardware investment • Increasing the performance of current functions • Enhancing network or application availability, reliability, and stability
Cisco TAC Support	With more than 1000 highly trained customer support engineers, 390 CCIE® experts, and access to 13,000 research and development engineers, Cisco TAC complements your in-house staff with a high level of knowledge in data-, voice-, and video-communications networking technology. Its sophisticated call-routing system quickly routes calls to the correct technology personnel. The Cisco TAC is available 24 hours a day, 365 days a year.

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Service Feature	Benefits
Cisco.com	This award-winning Web site provides 24-hour access to an extensive collection of online product and technology information, interactive network management and troubleshooting tools, and knowledge-transfer resources that can help customers reduce costs by increasing staff self-sufficiency and productivity.
Advance Hardware Replacement	Advance-replacement and onsite field-engineer options supply fast access to replacement hardware and field resources for installing hardware, minimizing the risk of potential network downtime.

Table 9. Technical Support Services-Competitive Differentiators

Feature	Benefits
Worldwide Virtual Lab	This extensive lab of Cisco equipment and Cisco IOS Software releases provides an invaluable engineering resource and knowledge base for training, product information, and recreation and testing of selected network issues to help decrease time to resolution.
Cisco TAC Training • **"Boot Camps"** • **Tech Calls** • **Tech Forums**	Cisco is committed to providing customers the latest in technology support. These Cisco TAC training programs assist customers in case avoidance as well as provide knowledge transfer of Cisco networking expertise.
Cisco Live	A powerful suite of Internet-enabled tools with firewall-friendly features, these secure, encrypted Java applets can turn a simple phone call into an interactive collaboration session, allowing a customer and Cisco TAC support engineer to work together more effectively.
Global Logistics	This feature delivers award-winning, worldwide hardware-replacement support with 650 depots, covering 120 countries, at a US$2.3 billion investment in inventory, taking advantage of 10,000 onsite field engineers.
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